WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

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* PROJECT BEACON

A special task force created by the Federal Aviation Agency today made public its plan to spend about $500 million during a five year period for improved safety and utilization of airspace. This would double present spending plans. Complete text of the report will be available from the Government in the near future. Here are some of the technical highlights:

✓ Collision Avoidance Systems: "There is very great doubt as to whether users will find systems of these types to have any utility commensurate with their cost." However, "it seems highly desirable that system tests be made of experimental equipment as early as possible. If the results are encouraging, then final development can be expedited."

✓ Proximity Warning Indicators: Present programs involving infrared, optical and ultra-violet phenomena designed to "tell the pilot where to look" can be "highly useful" and these projects should be "vigorously pursued."

✓ Navigation: The presently planned system of very high frequency omni-ranges, (VORTAC) with the addition of distance measuring equipment (DME) "appears to be adequate" for the volume of traffic expected over most airways in the next 10 to 15 years. As volume grows, it will probably be necessary to place increased emphasis on DME equipment to reduce the lateral separation of airways.

✓ All-weather Take-off and Landing: Immediate development, fabrication and installation of improved instrument guidance aids, both radio and visual, in manual and automatic approach, is recommended. This includes more, improved lighting and improvements in accuracy of both lateral and vertical guidance for instrument landing systems (ILS). This should be followed by a long-term R&D program looking toward an integrated all-weather final approach, flare and landing system with all-weather take-off capability for both manual and fully automatic operations.

✓ Air Traffic Control: Control should be based on aircraft position information continuously available on the ground, and independent of the pilot's navigational information. All aircraft above 12,500 pounds gross weight should be required to carry altitude reporting beacon transponders for use both en route and in terminal areas, with the information presented on radarscopes. No three-dimensional radar or other height-finding equipment offers sufficient promise of being able to do this from the ground. A short range beacon for terminal area use appears feasible at a price no greater than $500.

✓ General Purpose Computers: These should be employed for both routine en route and terminal control operations. FAA says "this would be less elaborate than computer systems formerly under development for air traffic control." Modification of the SAGE air defense surveillance and control system is ruled out; only the radar part of SAGE would be employed for air traffic control.

* RADIO REFRACTIVE INDEX CENTER ESTABLISHED

Sufficient data to survey and plot radio refractive index profiles for the atmosphere of the entire earth is the goal of a center established by the National Bureau of Standards at its Boulder (Colo.) Laboratories.

The data collected at this Center deals with the variable refraction of radio waves at given times, heights and places. This information is correlated and made available to scientific, government and industrial groups.

Applications of this information include the evaluation of missile tracking and guidance systems, the establishment of error correction for height-finding radars, the prediction of transmission losses for tropospheric communications links, and the estimation of radio wave field strengths for many types of radio communication.

(For further details of this service, write the Radio Meteorology Section, National Bureau of Standards, Boulder, Colo.)

* MARINE CORPS REJECTS ROTORCYCLE

The U. S. Marine Corps Equipment Board has recommended against procurement of the YRON-1, one-man rotorcycle developed by the Gyrodyne Corp. of America. The single-place helicopter incorporates two-two-bladed coaxial counter-rotating rotors, and is powered by a modified Porsche automotive engine.

Performance of the machine "was more than adequate" the Marine study showed, and "in the hands of an experienced operator can perform limited reconnaissance, observation, courier and resupply missions during daylight hours under favorable weather conditions."

However, the Equipment Board concluded that "the tactical use...is limited due to its short range and endurance, small payload and questionable operating capability under other than good weather conditions. The Board added that the vehicle did not meet tentative requirements for "a vertical lift vehicle portable by one man, simple to maintain, and requiring operator training of a degree comparable to that given motor vehicle operators."

* ARMY R&D CONTRACT PRICING

Lt. General Arthur G. Trudeau is warning industry that the Army is strengthening its ability to preparate separate -- and sealed -- government cost and engineering estimates on new research and development projects.

Here is the Army Research Chief's explanation:

"These will be used to give much more careful scrutiny and comparison to proposals and to bids received, which out of necessity must frequently be on the cost-plus-fixed-fee basis. We are also...going to scrutinize very carefully the performance records of all contractors before new contracts are let. And here we will be looking at past performances as regards quality, time and overruns."

* WHERE ARE THE SCIENTISTS?

The National Science Foundation, studying records of 112,432 scientists, reports that:

✓ The largest number of full-time employed scientists were from the Middle Atlantic States -- 24,528 of the total. The fewest, 3,833, were from the East South Central States.

✓ Scientists employed in the Middle Atlantic states reported the highest median salary, $10,000. The lowest median salaries, $8,000, were reported by scientists employed in the West North Central and Mountain geographic regions.

(For further details, write the National Science Foundation, Washington 25, D. C. for a copy of Scientific Manpower Bulletin No. 15)

TECHNICAL TRENDS

□ The Bureau of Naval Weapons, Code RA-444, Washington 25, D. C. expects to begin buying quantities of a new assault transport helicopter for the Marine Corps beginning in 1964. The machine will be turbine-powered, compatible with assault landing ships, and have a maximum gross weight of 3500 pounds. Industrial proposals are now being solicited. √√√ U. S. Geological Survey Offices at Tallahassee, Florida and Washington, D. C. have available for inspection an unpublished new survey indicating that water supplies near Cape Canaveral, Fla. generally are adequate, but require treatment for most purposes. √√√ A statistical report on inorganic chemicals and gases for 1960 (Publication M28A(60)-13) is available at 25 cents from the Publications Office, Industry Division, Bureau of the Census, Washington 25, D. C. √√√ Information on a new sound-color film on Volcanic Eruptions in Hawaii is available from the Department of Agriculture, Motion Picture Service, Washington 25, D. C. Copies may be purchased, or will be available for limited free circulation to educational institutions at a later date.

□ Single free copies of a new technical fact sheet on the SPERT-IV, Special Power Excursion Reactor, are available from the Manager for Information, U. S. AEC, P. O. Box 2108, Idaho Falls, Idaho. √√√ The National Bureau of Standards, Office of Technical Information, Washington 25, D. C. has available a summary report on the first extensive tables of the relative intensities of 39,000 spectral lines, of special interest to spectrochemists. √√√ A report indicating that coal constitutes 68 percent of the total U. S. recoverable reserves of mineral fuels is available at 50 cents from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Ask for U. S. Geological Survey Bulletin 1136. √√√ A new brochure on programs for research by graduate students is available without charge from the Oak Ridge Graduate Fellowship Office, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tenn.

□ The Navy has found that the cruising ranges of small vessels, such as minesweepers, can be increased as much as 50 percent through the use of collapsible rubber fuel-storage cells as a replacement for heavy, 50-gallon drums. The lighter weight of the rubber cells permits the storage of greater amounts of fuel. √√√ The Federal Communications Commission, Technical Research Division, Room 2220, New Post Office Building, Washington 25, D. C. has available single free copies of Report TR-6103, listing all Division reports since 1946. √√√ Westinghouse Corp., Pittsburgh, Pa. states that the most powerful arc heater ever constructed will be built for the civilian space agency's research center at Langley, Va. The $1 million heater is expected to supply a 10-minute stream of clean, high pressure air reaching temperatures of approximately 12,000° F. An accompanying $75,000 contract authorizes study of the behavior of hydrogen rather than air in the arc heater process. √√√ Lear, Inc., Instrument Division, is developing for the Army Ballistic Missile Agency an inertial guidance system which employs three gas-drive gyros for direct stablization of the platform. The device may be used for short and medium range tactical missiles -- and is expected to cost a fraction of the price of conventional electrical gyro systems. √√√ All American Engineering Co., Wilmington, Del. has received a Navy contract for development of a so-called "Water Twister" runway arresting gear system which employs rotary hydraulic shock absorbers. The device will be evaluated for SATS, the short airfield tactical support program.

□ The Reports and Industrial News Branch, Division of Public Information, U. S. Atomic Energy Commission, Washington 25, D. C. has available a limited number of free reports on "Facilities for Radiation Pasteurization of Foods." √√√ Information on a new radionuclide standard sample, yttrium 88, and re-issues of two previously available radionuclides, zinc 65 and manganese 54, may be obtained from Radioactivity Standard Samples, Radioactivity Section, National Bureau of Standards, Washington 25, D. C. √√√ Information on the 1962 NATO Fellowship Program for study in the sciences abroad is available from the Fellowship Office, National Academy of Sciences, 2101 Constitution Avenue, Washington 25, D. C.

* ARMY MEDICAL SERVICE RESEARCH PROBLEMS

Here is the latest summary of selected research and development problems as compiled by Army Medical Service. Proposed solutions to these problems are sought from industry, universities, non-profit organizations and individuals.

Comments, inquiries and proposed solutions should cite problem number and should be forwarded to:

Commanding General,
U. S. Army Medical Research and Development Command
Washington 25, D. C.

Attn: Code MEDDH-DE

Note: Problem numbers are nonconsecutive because of deletion of prior requirements.

□ AMEDS - 1 -- Develop a compact folding microscope with built-in light. (There is a need for a very small microscope which is capable of being transported and used in the field. The concept of military operations in primitive and underdeveloped areas place a greater demand on the diagnostic facilities in the application of preventive medicine. To properly effect medical support of small units deployed in these areas it is necessary for the microscope to have sufficient magnification and resolution to examine such specimens as blood smears for malaria, blood counts, and routine diagnostic laboratory work. In addition the microscope should be contained in a package which offers maximum protection against the environment and rough handling experienced in field use.)

□ AMEDS - 5 -- Develop an electronic system for correlation of data which will assist the physician in making a definitive diagnosis. (It is desirable that some system, possibly using electronic data processing, be developed which will enable the physician to feed in data obtained by observation, physical examination, laboratory procedures, and X-ray and receive from the system either a complete and accurate diagnosis or a list of possible diagnoses. With the latter it would be desirable to have some indication of the probability associated with each possible diagnosis and suggested additional procedures which might assist the physician in reaching a decision. A prognosis for each particular case would also be desirable. Equipment required by the system must either be simple and economical enough to justify its use at a single installation or must incorporate communications necessary to enable one system to serve a number of installations.

This requirement is not simply for an electronic computer but for an electronically programmed system, including necessary input data. In addition, it is believed the system should assist, rather than replace the diagnostician.)

□ AMEDS - 6 -- Develop an expendable fixed temperature shipping container. (Essential medical supplies subject to damage by freezing, excessive heat or storage above normal refrigeration temperature require an economical means of maintaining proper storage temperature. This container should be sufficiently durable to withstand the effects of handling during aerial delivery operations which include air landed or paradrop techniques. The material should also be water repellant to prevent the effects of exposure to rain or submersion from destroying its insulating properties.

Special operations such as vertical envelopment, amphibious landings or aerial delivery preclude the extra weight now necessary to over pack the medicinal packages in order to provide adequate protection. The problem of limited space in refrigerated compartments of cargo ships could be resolved by use of a special container which could be rotated in order to re-establish the desired temperature. The sealed container should be capable of retaining the temperature between 35° - 50°F in ambient temperature ranging from a minus 25°F to plus 125°F for a period of 21 days. The maximum extremes required for storage would be a minus 65°F for three days and plus 155°F for periods up to four hours daily; no solar radiation and absolute humidity as high as 13 grains per cubic foot.)

* ARMY MEDICAL SERVICE RESEARCH PROBLEMS (Continued)

□ AMEDS - 8 -- Develop cheap, disposable, non-breakable containers for drugs, biologicals and USP reagents. (The Army Medical Service requires a non-breakable container which will provide maximum efficiency in transporting, storing and dispensing drugs for medical treatment facilities of the Army In The Field. These containers should have a configuration which in so far as possible will have a minimum of wasted space. In some cases, it is desirable to have a collapsible capability as for example a bottle that holds 1000 tablets that could be reduced in size as the medication is dispensed. However, these containers must adequately protect the contents from the deteriorating effects of the environment.

Conventional containers for medicines have several undesirable characteristics for military application. First is the use of glassware which necessitates considerable over pack and special handling to prevent breakage. Second is the wasted space which results from the configuration, i.e., the long neck, sloping shoulders and the nearly round body.

Another undesirable feature which should be carefully considered is the size and shape of the intermediate and original packages and the arrangement of the unit packages therein. There is a varied history of modified applications of the use of medical chests by Division Medical Supply Officers and Army Medical Depot Commanders. Some have placed the chests or original packages on their side and mounted them to trucks; some have fabricated new chests or portable shelving which were easily mounted in trucks. Whatever the method the ultimate results was aimed at a highly mobile efficient medical supply operation.

It is realized that the special packaging imposed by this requirement is not compatible with industry at this time. However, it is proposed that the establishment of appropriate specifications will in the long procurement period enable both industry and the military to achieve mutual benefits.)

□ AMEDS - 9 -- Develop substitutes for laboratory glassware. (The requirement is for laboratory glassware substitutes which will not break when subjected to extremes of heat and cold and rough handling. Limited field application of laboratory techniques has resulted in the use of commercially available equipment which is designed to meet the sophisticated requirements common in the United States for clinical diagnosis. In order to achieve a better capability to function under field conditions a durable substitute for glassware is needed.

Commensurate with the clinical laboratory techniques available the substitute glassware must be miniaturized, not become cloudy or brittle during extended periods of storage nor react adversely from the contents of the containers. It must be able to withstand a free fall of four feet and to withstand the heat generated for purposes of the test conducted.)

□ AMEDS - 12 -- Design an improved field hospital bed. (There is a requirement for an expandable styrofoam type material which when released into a mold will form a light durable device suitable for use as a hospital bed. The foam construction of the device should serve as a mattress and be impervious to blood and other body fluids. This device should be cheap enough that upon displacement of the medical unit the beds could be abandoned or destroyed.)

□ AMEDS - 19 -- Develop a monitoring device for constant recording of pathogenic concentrations. (There is a requirement for an accurate differential continually recording electronic device which will indicate the concentration of pathogenic organisms in the air. This device would be used in surgery, hospital wards, and treatment areas where there is a massive exposure of unprotected flesh or body organs. The principle of operation would be similar to the constant recording device used with the Beckman spectrophotometer in controlling octane content in the manufacture of gasoline. It should be equipped with an alarm system which would be activated by a dangerously high concentration of pathogenic organisms.)

(To be continued)

TECHNICAL PROBLEM SUMMARIES

These summaries and lists of information sources have been prepared to meet specific inquiries received by the Organization for Economic Co-operation and Development over the past five years. Single copies are free. Cite QR number and title, and write to: OECD, Specialized Information Section,
3, rue Andre Pascal
Paris, France

- ☐ QR 10 - Chromium-plating of Steel Balls
- ☐ QR 11 - Internal Cooling of Grinding Wheels
- ☐ QR 101 - Straightening of Steel Spring Wire
- ☐ QR 102 - Breaking up of Cast-Iron Scrap
- ☐ QR 103 - Heat-resistant coating on the Brass Element of a Thermostat
- ☐ QR 104 - Repair of Porcelain Enamel Surfaces
- ☐ QR 105 - Etching Cavities in Steel Die Blocks
- ☐ QR 110 - Application of Epoxy Compounds
- ☐ QR 111 - Polyvinylchloride Pipes
- ☐ QR 153 - Recovery of Sulphur Dioxide
- ☐ QR 164 - Mobile Crop Dryers
- ☐ QR 210 - Decontamination of Radioactive Water
- ☐ QR 291 - Transfer of X-Ray Photographs
- ☐ QR 353 - Silvering of "Plexiglas"
- ☐ QR 574 - Selection and Development of New Products by Individual Companies
- ☐ QR 1236 - Storage of Liquefied Carbon Dioxide
- ☐ QR 1364 - Productivity and Profitability of Industrial Scientific Research
- ☐ QR 1383 - Proton Microscope
- ☐ QR 1405 - Market Research Institutes
- ☐ QR 1563 - Fuel Cells
- ☐ QR 1684 - Mechanical High Energy Shock Treatment of Materials
- ☐ QR 1834 - Machine Translation
- ☐ QR 1913 - Friction Welding
- ☐ QR 1924 - Oil Treatment of Coal and Other Minerals
- ☐ QR 1950 - Construction of Lecture Rooms and Laboratories
- ☐ QR 2050 - Methods of Cutting Steel Plate

Note: These reports were issued as part of a Question and Answer Service which is open for inquiries from all over the world, and is free of charge. OECD says "Its primary purpose is to collect information on an international level, as enquirers are usually well-informed of practice in their own countries." When possible, direct contacts are encouraged between those submitting an inquiry and those who have information which may apply.